

## Additional Two Species of Digenean Trematodes from Mullet of Southern Japan

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**Abstract** In the previous paper (Machida, 1996), eight species of digenean trematodes were recorded from mullets of Japan and the adjacent waters. Two more species from mullet *Moolgarda seheli* of Japan are added to this list. *Haploporus musculosaccus* sp. nov. (Haploporidae) is characterized by possessing a retort-shaped hermaphroditic sac with thick muscular wall, and a genital pore on the anterior margin of the acetabulum. *Lecithaster mugilis* Yamaguti, 1970 (Lecithasteridae) is redescribed, differing from the closely related *L. stellatus* Looss, 1905 by having a preacetabular pit.

**Key words:** Digenea, Haploporidae, Lecithasteridae, new species, mullet, Japan, taxonomy.

In my previous paper (Machida, 1996), descriptions of eight species of digenean trematodes were made from mullets of Japan and the adjacent waters. The present paper deals with additional two species of digenean trematodes including a new haploporid species from mullet of southern Japan. The digeneans collected were washed in saline, fixed in AFA under slight pressure, stained with Heidenhain's hematoxylin and mounted in Canada balsam. The specimens are deposited in the National Science Museum, Tokyo (NSMT). Measurements are given in millimeters unless otherwise stated.

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In the previous paper (Machida, 1996), I identified the host mullet from Okinawa, southern Japan as *Crenimugil crenilabis* based on the "Coastal Fishes of Southern Japan" by Masuda *et al.* (1980). Senou (2000) corrected *Crenimugil crenilabis* of Masuda *et al.* (1980) to *Moolgarda seheli* in the "Fishes of Japan with Pictorial Keys

to the Species." Therefore, the host *Crenimugil crenilabis* in my previous paper should be corrected to *Moolgarda seheli*. I am especially indebted to Dr. G. Shinohara of the National Science Museum, Tokyo, for verifying my identification of the host.

Family Haploporidae Nicoll, 1914

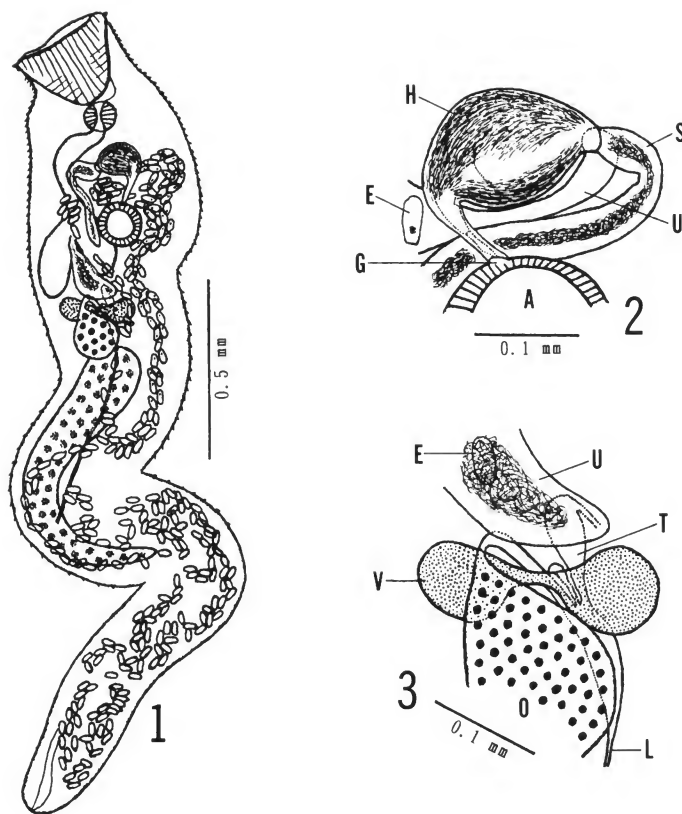
Genus *Haploporus* Looss, 1902

*Haploporus musculosaccus* sp. nov.

(Figs. 1–3)

**Material.** From intestine of *Moolgarda seheli* (Mugilidae), Nago, Okinawa Prefecture, Japan, 14–V–1993 (NSMT-PI 4365b, holotype & 6 paratypes) and intestine of *M. seheli*, Nago, 17–V–1993 (NSMT-PI 4379 & 4380, 3 paratypes).

**Description.** Based on 10 specimens. Body slender, tapering posteriorly, 1.62–3.26 long by 0.40–0.66 wide near acetabular level. Tegument spinose, sparse posteriorly. Oral sucker terminal, funnel-shaped, 0.17–0.23×0.17–0.29, with sensory papillae on the apical margin. Prepharynx very short, up to 0.03 long. Pharynx globular, 0.06–0.09×0.06–0.11. Esophagus 0.17–0.60 long. Intestinal bifurcation in or near acetabular zone. Caeca short, saccular, extending to between



Figs. 1–3. *Haploporus musculosaccus* sp. nov. — 1. Entire worm, ventral view (holotype, NSMT-PI 4365b). 2. Terminal genitalia, ventral view. 3. Ovarian complex, ventral view.

acetabulum and testis. Acetabulum nearly spherical, weakly developed,  $0.10\text{--}0.16 \times 0.13\text{--}0.17$ . Sucker ratio  $1:0.5\text{--}0.7$ . Forebody  $20\text{--}41\%$  of body length.

Testis single, longitudinally elongated, tapering posteriorly,  $0.42\text{--}1.04 \times 0.15\text{--}0.30$ , with its anterior extension lying some distance posterior to acetabulum. Posttesticular space  $16\text{--}40\%$  of body length. Two vasa efferentia arising from near anterior border of testis and each joining external seminal vesicle. External seminal vesicle tubular, curved; variable in position depending on fixation, anterolateral, lateral (dextral or sinistral) or posterolateral to acetabulum; posterior extent from near postacetabular level to a level midway between acetabulum and testis. Hermaphroditic sac retort-shaped, consisting of two portions; proximal portion subglobular with thick muscular wall, and distal portion slender handle-

shaped with thin wall; anterior, antero-lateral (dextral or sinistral) or lateral to acetabulum, sometimes partly overlapping it, not extending posterior to acetabulum. Proximal portion containing large ovoid seminal vesicle ( $0.11\text{--}0.14 \times 0.07\text{--}0.10$  in 3 specimens) which connects with metraterm by short duct (pars prostatica?). Distal portion including slender, membranous hermaphroditic duct. Genital pore median, on anterior margin of acetabulum.

Ovary subglobular, median,  $0.10\text{--}0.20 \times 0.11\text{--}0.18$ , anterior to slightly overlapping testis. Oviduct arising from anterior tip of ovary, descending diagonally, and slightly expanded forming a small elongate swelling. Oviduct turning forward at anterior border of the swelling to receive common vetelline duct, and entering ootype which connects with uterus by slender duct. Laurer's canal originating from posterior

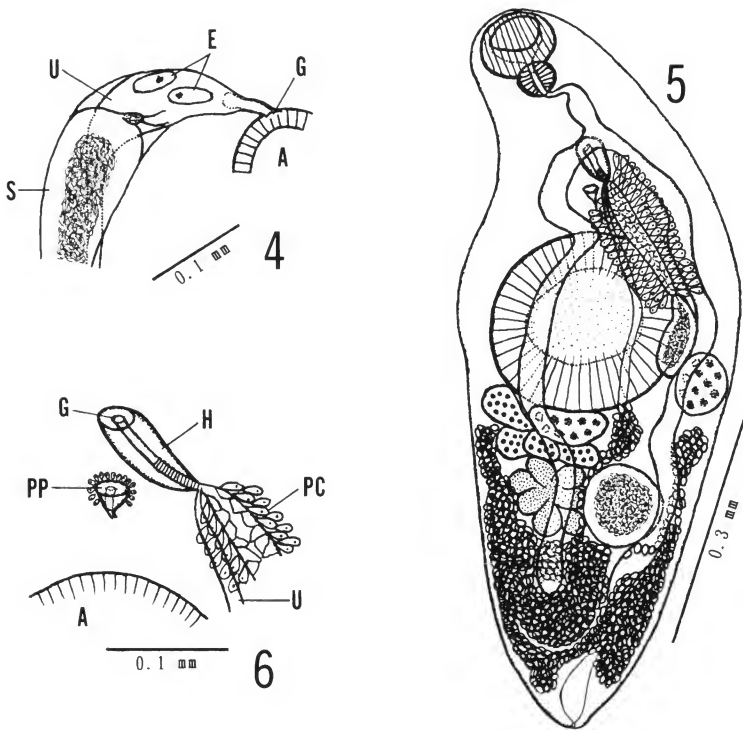


Fig. 4. Terminal genitalia of anomalous *Haploporus musculosaccus*, ventral view.

Figs. 5 & 6. *Lecithaster mugilis* Yamaguti, 1970. — 5. Entire worm, dorsal view (original, NSMT-PI 4920).

6. Terminal genitalia, ventral view. A, acetabulum; E, egg; G, genital pore; H, hermaphroditic sac; L, Laurer's canal; O, ovary; PC, prostatic cell; PP, preacetabular pit; S, seminal vesicle; T, ootype; U, uterus; V, vitellarium.

border of the aforementioned swelling, descending almost straight, and opening dorsally near mid-testicular level or more posteriorly. Uterus descending to near posterior end of body before extending anteriorly. Proximal portion of uterus filled with sperm. Vitellaria two compact masses, each  $0.07\text{--}0.11 \times 0.06\text{--}0.11$ , lying symmetrically on each anterolateral side of ovary. Eggs elliptical, thin-shelled,  $45\text{--}54 \times 17\text{--}23 \mu\text{m}$ . Miracidial eyespots present in eggs of distal portion of uterus. Excretory vesicle long tubular, reaching near anterior border of testis; pore terminal.

*Anomalous specimen* (Fig. 4). One anomalous specimen without muscular portion of hermaphroditic sac is found with normal specimens of *Haploporus musculosaccus*. Terminal end of uterus slightly swollen, then tapering distally as hermaphroditic duct. Seminal vesicle joining small prostatic vesicle ( $20 \times 11 \mu\text{m}$ ) which con-

nects with mid-region of uterine swelling ventrally by short duct ( $25 \mu\text{m}$  long). The other features agree with those of *H. musculosaccus*. Eggs normally developed,  $49\text{--}55 \times 19\text{--}24 \mu\text{m}$ .

*Remarks.* According to Liu and Yang (2002), eight species of *Haploporus* including their new species *H. mugilis* have been described. Of them, the present new species is similar to *H. indicus* Rekharani & Madhavi, 1985 and *H. pseudoindicus* Rekharani & Madhavi, 1985, both from mullets of India, in having a funnel-shaped oral sucker and the intestinal bifurcation situated in or near the acetabular zone. However, differences are observed in that both Indian species possess long caeca terminating in the testicular zone, a genital pore lying a short distance anterior to the acetabulum, and a hermaphroditic sac taking claviform or cylindrical in shape without a thick muscular portion.

Family Lecithasteridae Odhner, 1905

Genus *Lecithaster* Lühe, 1901

*Lecithaster mugilis* Yamaguti, 1970

(Figs. 5 & 6)

**Material.** From intestine of *Moolgarda sehelii* (Mugilidae), Nago, Okinawa Prefecture, Japan, 13–V–1993 (NSMT-PI 4354); intestine of *M. sehelii*, Nago, 6–III–1996 (NSMT-PI 4845); intestine of *M. sehelii*, Nago, 7–III–1996 (NSMT-PI 4859); and intestine of *M. sehelii*, Nago, 14–III–1996 (NSMT-PI 4920).

**Description.** Based on 10 specimens three of which are partly crushed. Body small, fusiform, 0.66–1.15 long by 0.32–0.45 wide at acetabular level. Tegument smooth. Oral sucker subterminal, 0.07–0.11×0.09–0.14, sometimes surmounted by preoral lobe. Pharynx globular, 0.04–0.07×0.04–0.07. Esophagus 0.05–0.13 long, bifurcating midway between suckers. Caeca extending near beginning of posterior 1/3 of hindbody. Esophagus and beginning of caeca with sclerotized lining. Acetabulum large, 0.22–0.32×0.22–0.30. Sucker ratio 1:2.1–2.7. Forebody 36–48% of body length.

Testes ovoid, almost symmetrical, near or in contact with posterior margin of acetabulum; right testis 0.05–0.14×0.07–0.12 and left testis 0.05–0.16×0.05–0.11. Seminal vesicle varying in shape from nearly spherical (0.08–0.12×0.04–0.07) to elongate (0.22–0.35×0.03), with its posterior extension lying between midacetabular level to slightly posterior to acetabulum. Pars prostatica well-developed, 0.09–0.19 long, surrounded by large prostatic cells, usually extending posteriorly near midacetabular level. Hermaphroditic sac cylindrical, 0.06–0.11×0.04–0.05, enclosing straight or slightly bent hermaphroditic duct. Hermaphroditic duct consisting of two portions; proximal portion lining with fine villi and distal portion with sclerotized lining. Genital pore median, midway between pharynx and acetabulum, near bifurcal level. Preacetabular pit with short posterior sac or duct lying midway between genital pore and acetabulum.

Ovary four-lobed, 0.10–0.29×0.13–0.19 as a whole, submedian, just or slightly posterior to acetabulum. Vitellaria compact, consisting of seven oval lobes, 0.08–0.17×0.07–0.14 as a whole, immediately posterior to ovary. Oviduct arising from central region of ovary, giving off duct to seminal receptacle, receiving common vitelline duct, then entering ootype. Seminal receptacle globular, 0.09–0.15×0.04–0.13, in ovarian-vitelline zone. Uterus occupying most of postacetabular space. Eggs 15–19×11–13  $\mu$ m. Excretory pore terminal; slender stem not visible anteriorly beyond posterior edge of vitellaria; single concretion 30–41×15–30  $\mu$ m lying in posterior end of stem in some specimens.

**Remarks.** Yamaguti (1970) originally described *Lecithaster mugilis* from *Mugil cephalus* of Hawaii. He separated this species from others in *Lecithaster* by having an enormous acetabulum and a three-lobed ovary. His specimens (holotype and paratypes USNPC No. 63789; other paratypes MPM Coll. No. 15242) are so macerated that the body and organs are not normal in shape and position. My reexamination revealed his specimens to have a four-lobed ovary, vitellaria composed of seven lobes and a preacetabular pit as in my material. With the exception of the sucker ratio, the measurements of my specimens overlap those given by Yamaguti (1970). My specimens have a sucker ratio of 1:2.1–2.7, whereas Yamaguti gave a larger sucker ratio of 1:3.5. His ratio seems to be inaccurate because his specimens have distorted suckers. I consider my specimens to be *L. mugilis*.

Consequently, *L. mugilis* is in close agreement with the description of *L. stellatus* Looss, 1907 (Yamaguti, 1934, 1970; Manter & Pritchard, 1960, etc.) which also occurs in southern Japan; only difference is the absence of a preacetabular pit in *L. stellatus*. Looss (1907) mentioned the preacetabular pit in the generic diagnosis of *Lecithaster* and figured it in the type species *L. confusus* Odhner, 1905. The presence of a preacetabular pit in *Lecithaster* is not a generic character but distinguishes species. I described and illustrated *L. mugilis* again based on my non-mac-

erated specimens.

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